

What is claimed is:

1. A filter system, comprising:
  - a guide tip having a proximal portion and a distal portion, the guide tip defining a guidewire lumen therethrough adapted to receive a guidewire;
  - an elongated wire having a proximal end and a distal end, the distal end of said elongated wire attached to the proximal portion of said guide tip;
  - an embolic protection filter disposed along the elongated wire; and
  - an elongated tubular member extending distally to a distal sheath, the elongated tubular member defining a first lumen adapted to receive the elongated wire, and a second lumen adapted to receive the guidewire; wherein, in use, the embolic protection filter is collapsible at least in part within the distal sheath.
2. The filter system of claim 1, wherein the guide tip has a tapered profile.
3. The filter system of claim 1, wherein the proximal portion of said guide tip has a larger profile than the distal portion of said guide tip.
4. The filter system of claim 1, wherein the guide tip includes a radiopaque marker band.
5. The filter system of claim 1, wherein the guide tip includes a spring coil.

6. The filter system of claim 5, wherein the spring coil includes a radiopaque material.

7. The filter system of claim 1, wherein the distal portion of said guide tip is atraumatic.

8. The filter system of claim 1, wherein the guidewire lumen of said guide tip is substantially straight.

9. The filter system of claim 1, wherein the guidewire lumen of said guide tip includes a curved portion.

10. The filter system of claim 1, wherein the proximal portion of said guide tip includes a tapered hole, and wherein the distal end of said elongated wire is attached to the guide tip at said tapered hole.

11. The filter system of claim 1, wherein the proximal portion of said guide tip includes a joint, and wherein the distal end of said filter wire is attached to the guide tip at said joint.

12. The filter system of claim 11, wherein the distal end of said elongated wire includes attachment means configured to provide an interference fit with the joint on the proximal portion of said guide tip.

13. The filter system of claim 12, wherein said attachment means is a coil disposed about the distal end of said elongated wire.

14. The filter system of claim 1, wherein the embolic protection filter is adapted to self-deploy when removed from the distal sheath.

15. The filter system of claim 1, wherein the embolic protection filter comprises a filter membrane operatively coupled to a support hoop and suspension arm, the support hoop forming a mouth for filtering embolic debris within a vessel.

16. The filter system of claim 15, further comprising a radiopaque coil disposed about the support hoop.

17. The filter system of claim 1, wherein the embolic protection filter and guide tip are coupled to a frame.

18. The filter system of claim 17, wherein the frame includes a port and an inner lumen configured to slidably receive the guidewire.

19. The filter system of claim 17, wherein the frame includes a coil.

20. The filter system of claim 17, wherein the frame includes a slotted tube.

21. The filter system of claim 20, wherein the slotted tube includes one or more sections having differing flexibility characteristics.

22. The filter system of claim 1, wherein the proximal portion of said guide tip is configured to slide at least in part within the distal sheath.

23. The filter system of claim 1, wherein the distal sheath includes one or more skived regions.

24. The filter system of claim 23, wherein said one or more skived regions are interposed between one or more collars.

25. The filter system of claim 1, further comprising a loading tool.

26. The filter system of claim 1, wherein the first lumen of said distal sheath includes a first port for insertion of the filter wire, and wherein the second lumen of said distal sheath includes a second port for insertion of the guidewire.

27. The filter system of claim 26, wherein the first and second ports terminate at a distal end of the distal sheath.

28. The filter system of claim 26, wherein the second port is located proximal the first port.

29. The filter system of claim 1, wherein the elongated tubular member further includes a first exit port and a second exit port, the first exit port defining the proximal end of the first lumen, the second exit port defining the proximal end of the second lumen.

30. The filter system of claim 29, wherein the first exit port is located proximal the second exit port.

31. The filter system of claim 1, further comprising alignment means for radially aligning the guidewire lumen of said guide tip with the second lumen of said elongated tubular member.

32. The filter system of claim 31, wherein said alignment means comprises a key disposed within the distal sheath adapted to slide within a corresponding groove formed on the proximal portion of said guide tip.

33. The filter system of claim 1, further comprising a multiple-lumen retrieval sheath.

34. The filter system of claim 33, wherein the multiple-lumen retrieval sheath includes a first lumen adapted to receive the elongated wire, embolic protection filter, and the proximal portion of the guide tip, and a second lumen adapted to receive a second guidewire.

35. The filter system of claim 34, further comprising a longitudinal slit extending along at least a portion of the second lumen.

36. The filter system of claim 33, wherein the multiple-lumen retrieval sheath is configured for single operator exchange in the body.

37. A filter system, comprising: ~/

a guide tip having a proximal portion and a distal portion, the guide tip defining a guidewire lumen therethrough adapted to receive a guidewire;

an elongated wire having a proximal end and a distal end, the distal end of said elongated wire attached to the proximal portion of said guide tip;

an embolic protection filter disposed along the elongated wire;

an elongated tubular member extending distally to a distal sheath, the elongated tubular member defining a first lumen adapted to receive the elongated wire, and a second lumen adapted to receive the guidewire; wherein, in use, the embolic protection filter is collapsible at least in part within the distal sheath; and

a multiple-lumen retrieval sheath adapted to receive a second guidewire

38. A method for transporting intravascular devices through a body lumen, comprising the steps of:

providing a filter wire assembly comprising a filter wire, an embolic protection filter, and a guide tip, the guide tip having a guidewire lumen adapted to receive a guidewire;

providing a filter delivery device comprising an elongated tubular member extending distally to a distal sheath, the elongated tubular member having a first lumen adapted to receive the filter wire, and a second lumen adapted to receive the guidewire;

inserting a proximal end of the filter wire into the first lumen;

advancing the filter wire through the first lumen until the embolic protection filter is contained within the distal sheath, and the proximal portion of said guide tip is disposed at least in part within the distal sheath;

inserting a proximal end of the guidewire into the second lumen;

advancing the filter delivery device and filter wire assembly along the guidewire to a location within a vessel distal a lesion; and

deploying the embolic protection filter within the vessel.

39. The method of claim 38, further comprising alignment means for radially aligning the guidewire lumen of said guide tip with the second lumen of said elongated tubular member.

40. The method of claim 39, wherein said alignment means comprises a key adapted to slide within a corresponding groove formed on the proximal portion of said

guide tip, and further comprising the steps of aligning the key with the groove prior to sliding the proximal portion of the guide tip at least in part within the distal sheath.

41. The method of claim 38, further comprising the steps of:  
removing the guidewire from the vessel; and  
advancing a therapeutic device along the filter wire to perform a therapeutic procedure.

42. The method of claim 41, further comprising the steps of:  
providing a retrieval sheath containing a second guidewire;  
advancing the retrieval sheath along the filter wire to collapse the embolic protection filter within said retrieval sheath; and  
placing the second guidewire in the vessel.

43. A method for retrieving an embolic protection filter from a body lumen while maintaining wire access, comprising the steps of:

providing a multiple-lumen sheath having a filter retrieval lumen and a guidewire lumen, the guidewire lumen having a longitudinal slit;

advancing the multiple-lumen sheath along a wire coupled to the embolic protection filter;

positioning the filter retrieval lumen of said multiple lumen sheath proximal the embolic protection filter;



advancing a guide wire through said guidewire lumen to a desired location within said body lumen;

collapsing the embolic protection filter at least in part within the filter retrieval lumen; and

removing the multiple-lumen sheath and embolic protection filter from the body lumen through the longitudinal slit on the guidewire lumen.